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USAAVSCOM TECHNICAL REPORT 70-16

THE DESIGN, DEVELOPMENT, AND FLIGHT TESTING OF FIRE SUPPRESSANT VOID FILLER FOAM KITS FOR VARIOUS TACTICAL ARMY AIRCRAFT

By

William M. Willisford
The Goodyear Tire & Rubber Company

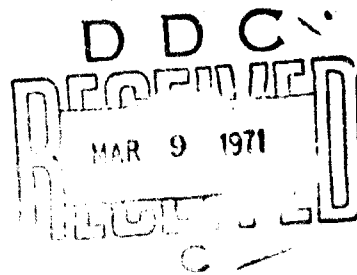
October 1970

U. S. ARMY AVIATION SYSTEMS COMMAND
ST. LOUIS, MISSOURI
CONTRACT DAAJ01-69-C-0039(3G)

PREPARED BY

THE GOODYEAR TIRE & RUBBER COMPANY
AVIATION PRODUCTS DIVISION
GOODYEAR, ARIZONA 85338

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FIRE SUPPRESSANT VOID FILLER FOAM KITS
FOR VARIOUS TACTICAL ARMY AIRCRAFT

Technical Report
APR-301

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Prepared by
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Aviation Products Division
Goodyear, Arizona 85338

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DA PROJECT/TASK 1F164207DC52/02

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DEPARTMENT OF THE ARMY
US ARMY AVIATION SYSTEMS COMMAND
PO BOX 209, ST. LOUIS, MO 63166

This report was prepared by the Goodyear Tire & Rubber Company, Aviation Products Division, Goodyear, Arizona, under the terms of Contract DAAJ01-69-C-0039(3G). It covers the work performed to evaluate fifteen (15) various tactical Army aircraft to determine if a fire suppressant, void filler foam kit could be designed for each, in order to reduce the aircraft vulnerability to fuel vapor ignition caused by incendiary hits into the fuel cell area.

The results of this effort produced competitive procurement packages (installation and detail drawings with kit installation instructions) for void filler foam kit to be installed in the UH-1B/C, AG-1G, OV-1A, CH-54A, and U-6A aircraft, which have the non-crashworthy fuel system installed. Prototype foam kits for the referenced aircraft (except the CH-54A) have been flight tested 200 hours by the U. S. Army Aviation Test Board, and will provide the additional protection to the aircraft fuel system as intended in this project.

This final report has been reviewed and concurred in by this Command.

SUMMARY

Fifteen various Army aircraft were examined under contract DAAJ01-69-C-0039(3G) to determine if a fire suppressant, void filler foam kit could be designed for each of them that would fill the void space surrounding the lower hemisphere of the fuel tank, thus reducing the susceptibility of the aircraft to fire from incendiary rounds. This report describes how this was accomplished.

The various aircraft were made available at Army facilities around the United States. Under Phase I of the contract Goodyear, accompanied by a technical representative of the Contracting Officer, examined these aircraft to determine if a kit could be designed to comply with the specific requirements of the contract. If it was determined that a kit was feasible, a kit was designed, a mockup of the foam was made and installed on location to confirm its fit. Phase II included the fabrication and installation of a complete prototype kit conforming to the configuration approved under Phase I. Phase III consisted of a 200-hour flight test conducted by the Government. Phase IV included the preparation of kit drawings and a draft MWO to ensure proper installation of the foam.

No adverse flight characteristics were discovered with any of the foam kits installed. One fault was reported. The plastic film envelope covering some of the foam blocks was improperly sealed, allowing an increase in the weight of the blocks due to liquid absorption.

Each of the kits designed should serve the purpose for which it was intended.

FOREWORD

This final report is a documentation of the work done under the DA Project/ Task Surviveability Equipment/Ballistic Protection, 1F164207-DC52/02, and involves the placing of a layer of lightweight polyurethane foam on the exterior surfaces of the aircraft fuel tanks in an effort to reduce the susceptibility of the aircraft to fire from incendiary rounds.

Appreciation is extended to Mr. John C. Rasmussen, Aviation Products Division of Goodyear Tire & Rubber Company under whose leadership this work was accomplished.

The management and technical performance of this R and D contract was monitored by Mr. James C. Butler, Aerospace Engineer, as Technical Contracting Officer's Representative from the research and development directorate, Subsystems Division.

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	iii
FOREWORD	v
LIST OF ILLUSTRATIONS	viii
BACKGROUND:	
a. Discussion	1
b. Materials Used.	1
THE VARIOUS AIRCRAFT, APPROACH, RESULT AND CONCLUSION:	
a. OH-6A (Cayuse)	2
b. AH-1G (Cobra)	2
c. UH-1D (Iroquois)	5
d. CH-54A (Tarhe)	6
e. U-6A (Beaver)	13
f. OV-1A (Mohawk)	17
g. U-1A (Otter)	17
h. OH-23G (Raven)	20
i. O-1D (Bird Dog)	20
j. U-8D (Seminole)	20
k. U-10A (Courier)	21
l. U-21A (Ute)	21
m. U-9B/C (Acro Commander).	21
n. UH-1B (Iroquois)	22
o. UH-1C (Iroquois)	23
p. UH-1B (Special)	23
LIST OF DRAWING NUMBERS OF THE FOAM KITS	29
DISTRIBUTION	30

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1	AH-1G, Foam, Fire Suppression Foam Blocks shown in front of AH-1G Aircraft	3
2	AH-1G, Foam, Cavity Between AH-1G Aircraft Skin and Main Fuel Tank Starboard Side.	4
3	CH-54, Fire Suppression Foam Blocks for Cell No. 1 . .	7
4	CH-54, Fire Suppression Foam Blocks for Cell No. 2 . .	8
5	CH-54, Fire Suppression Foam Blocks for Cell No. 3 . .	9
6	CH-54, Fire Suppression Foam Blocks for Cell No. 4 . .	10
7	CH-54, Fire Suppression Foam Blocks for Cell No. 5; Partial Display	11
8	CH-54, Internal View of Cell No. 5 with Fire Suppression Foam Partially Installed	12
9	U-6A, Fire Suppression Foam Blocks shown Alongside U-6A Aircraft	14
10	U-6A, Fire Suppression Foam Blocks Installed Around Fuel Tanks; Tanks Identified.	15
11	U-6A, Fire Suppression Foam Blocks Installed on Bulk-head Aft of Fuel Tanks	16
12	OV-1, Foam, Fire Suppression Foam Blocks for the OV-1 Aircraft Laid Out on Hangar Floor	18
13	OV-1, Foam, View of OV-1 Fuel Cell Cavity with Fire Suppression Foam Installed	19
14	UH-1C, Foam, Fire Suppression Foam Blocks Installed on Port Side under Battery Compartment of UH-1C Aircraft	24

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
15	UH-1B, Foam, Fire Suppression Foam Blocks, Installed on Port Side in Battery Compartment, with Battery Installed	25
16	UH-1C, Foam, Fire Suppression Foam Blocks, Installed on Starboard Side in Heater Compartment . .	26
17	UH-1B, Foam, Fire Suppression Foam Installed on Starboard Side in Heater Compartment	27
18	UH-1B, Foam, Fire Suppression Foam Blocks as Installed	28

BACKGROUND

a. Discussion

Studies indicate that fuel fires in military aircraft resulting from ballistic impacts are significant factors in the over-all vulnerability of the aircraft. Laboratory experiments indicate that fuel fires may be prevented or alleviated through application of low-density plastic foam to the outer walls of fuel tanks, fuel system components, and in all areas where a spark might be generated in the presence of fuel vapor.

Contract DAAJ01-69-C-0039(3G) required that the following aircraft be examined to determine if added protection could be provided by the addition of low-density plastic foam in the form of a kit, positioned and contoured so as to provide maximum lower hemisphere protection for all fuel cells:

a. OH-6A	(Cayuse)	i. O-1D	(Bird Dog)
b. AH-1G	(Cobra)	j. U-3D	(Seminole)
c. UH-1D	(Iroquois)	k. U-10A	(Courier)
d. CH-54A	(Tarhe)	l. U-21A	(Ute)
e. U-6A	(Beaver)	m. U-9B/C	(Aero Commander)
f. OV-1A	(Mohawk)	n. UH-1B	(Iroquois)
g. U-1A	(Otter)	o. UH-1C	(Iroquois)
h. OH-23G	(Raven)		

The fire suppressant foam material was to be in accordance with MIL-P-46111A and, if open cell, be covered with a film to prevent wicking of fluids. The installation of the kit was to be as simple as possible and be accomplished by personnel without special training or tools, at the lowest possible echelon of maintenance. Modification of the airframe was to be minimized.

b. Materials Used

The foam material used was Goodyear construction FCN-1 and conforms to MIL-P-46111A(MR), dated 5 December 1967 entitled "Plastic Foam Polyurethane (For Use in Aircraft)". The film envelope that was selected for covering the foam was Aclar 22A, 0.005 inches thick, available from the Allied Chemical Company, Morristown, New Jersey. The film conforms to Interim Federal Specification L-P-001174(GSA-FSS) Type I material.

THE VARIOUS AIRCRAFT, APPROACH, RESULT AND CONCLUSION

a. OH-6A (Cayuse)

An aircraft was made available for examination at Fort Eustis, Virginia on 30 July 1968. This aircraft has two fuel tanks of 32 gallons each, located under the floor. The rubber bladder fuel tanks can be removed through an access door in the floor above each tank. There is a void area under the sides and bottom of the cells that varies approximately 1.0 to 1.5 inches thick. It is covered on the top by the antiflowering liner that is held in place by rivets. Access is inadequate through the door to permit removal of the liner. The rivets holding the floor in place cannot be drilled out without destroying the integrity of the airframe.

After examination, the conclusion reached by the Goodyear engineer and the representative of the Contracting Officer was that a foam kit could not be designed for this aircraft without undesirable rework of the airframe and major aircraft modification.

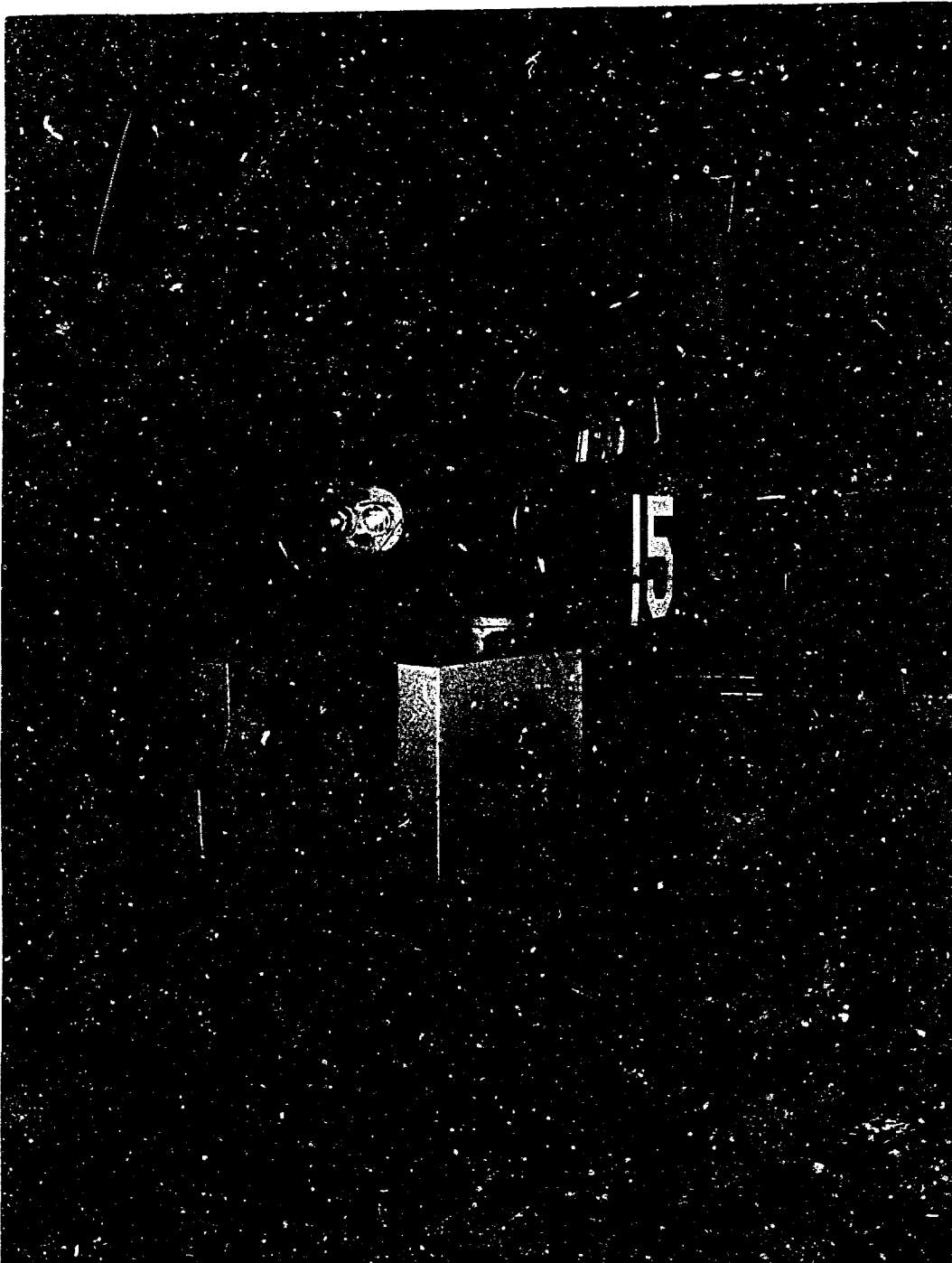
b. AH-1G (Cobra)

An AH-1G (Cobra) was made available for examination at Fort Eustis on 30 July 1968.

After the examination, the conclusion reached by the Goodyear engineer and the representative of the Contracting Officer was that the only practically accessible area where foam protection could be utilized was on the outboard faces of the forward tank. There, on each side, a wedge shape of foam with the largest dimensions 33.5 inches by 28 inches by 7 inches could be fitted. Controls and lines congested the area under the fuel tanks and extensive use of honeycomb precluded the use of foam panels on any other fuel tank face.

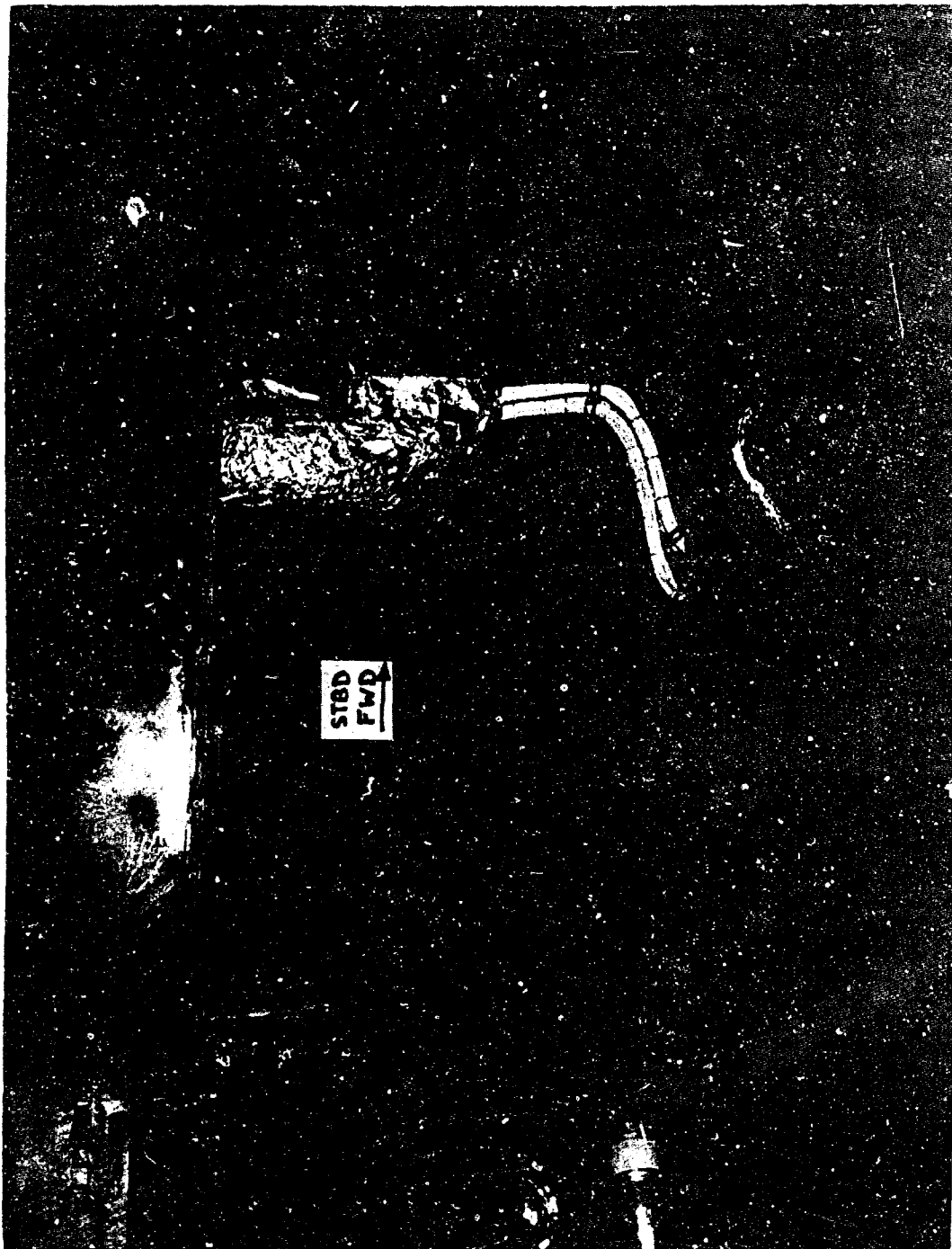
Sketches were prepared to describe the configuration of the foam that would be placed on the outboard surfaces of the forward tanks. Foam of various thicknesses had been shipped to the examination site, and from this, a foam mockup of the kit was fabricated. The mockup was installed and its fit reviewed jointly by the contractor and the representative of the Contracting Officer.

The contractor fabricated a complete prototype kit (Refer to Figures 1 and 2) and installed this kit on aircraft S/N 66-15355 at Fort Rucker, Alabama. The installation consisted of detaching the right and left wings, removing a panel on both the right and left side, placing the foam blocks in the cavity,



12319-1

Figure 1. AH-1G, Foam, Fire Suppression Foam Blocks Shown in Front of
AH-1G Aircraft.



12319-2

Figure 2. AII-1G Foam, Cavity between AII-1G Aircraft Skin and Main Fuel Tank, Starboard Side.

and reinstalling the panels and wings. The U. S. Army Aviation Test Board then conducted the 200-hour flight test.

The report, issued 20 May 1969 under USATECOM Project No. 4-AI-999-000-001, generated by the U. S. Army Aviation Test Board, describes the installation requirements and procedure, and the maintainability and reliability. No unsafe features, unscheduled maintenance or deficiencies were found. One shortcoming was reported, however. An improper seal along a lower edge of both blocks on the left side allowed 1.37 pounds of moisture to enter the foam during the 200-hour flight test. Since the entire kit weighed 6.94 pounds, the 1.37 pounds amounted to a 19 percent weight increase.

The kit appears to fill the 3 cubic foot void on the outboard faces of the forward fuel tank quite satisfactorily. The kit drawings now have a note that describes the minimum seal width requirement on the film envelope.

c. UH-1D (Iroquois)

An aircraft was made available for examination at Fort Eustis on 30 July 1968. This aircraft has two fuel tanks under the floor and three fuel tanks aft of the cabin. It was decided that a trip to the Army Aeronautical Depot Maintenance Center, (ARADMAC) Corpus Christi, Texas would be necessary in order to more readily determine the exact configuration of the foam.

On 8 October 1968, both UH-1D and UH-1H models were examined along the overhaul lines at ARADMAC. It appeared that a kit designed for the UH-1D could also be fitted to the UH-1H. The "B" and "C" models were also examined and measured. It appeared that the configuration of a kit for these models would be similar. The representative of the Contracting Officer asked that a foam kit be designed for both the "B" and "C" in addition to one for the UH-1D. A history of these models appears later in the report (refer to Pages 22 and 23).

Sketches were made and a mockup kit was cut for a UH-1D or H on the line at ARADMAC. It was installed and its fit reviewed jointly by the contractor and the representative of the Contracting Officer.

The contractor fabricated a prototype kit, and on 11 February 1969 attempted to install it for a flight test in aircraft S/N 66-1093 at Fort Rucker. The aircraft contained special test equipment and wiring that made most of the kit impossible to install. The entire kit was then shipped to Bell Helicopter Company, Fort Worth, Texas where a UH-1D

was being readied for a flight test of a Crashworthy Fuel System being developed under a Bell-AVLABS contract. It was believed that this UH-1D was a standard model, without any extra wiring or equipment.

On 16 July 1969 a fit check of the prototype was attempted on UH-1D aircraft S/N 68-15380 at Bell Helicopter Company. This aircraft had wires, brackets, and equipment located differently from the sample aircraft that was measured at ARADMAC. The Bell Helicopter Company then explained that not all UH-1D's are built alike. The Army makes changes as needs arise. There may be as many as 15 different versions of the UH-1D that could affect foam kit installations. AVLABS - Fort Eustis personnel instructed Bell to have a special kit fabricated for this test Crashworthy aircraft. Abandonment of the foam kit for the UH-1D aircraft on the Goodyear - AVSCOM contract was authorized on 16 March 1970.

Although no void filler foam kit was designed for any version of the UH-1D, a similar kit was designed and flight tested for the UH-1B. A history of that kit is contained in this report (refer to Page 22).

d. CH-54A (Tarhe)

Two trainer aircraft were made available for examination at Fort Eustis on 2 August 1968. It was found that there was a considerable volume of void space, 77 cubic feet, surrounding the five fuel tanks and it was all readily accessible when the rubber bladder fuel cells were removed and the anti-flowing liner was detached and moved up and away from the cavity face that it had been attached to. Each of the five fuel cells can be thought of as a rectangular solid, 80 inches wide by 33 inches long by 25 inches high.

Sketches were prepared, a mockup kit was cut for the aircraft, installed, and its fit reviewed jointly by the contractor and the representative of the Contracting Officer.

The contractor fabricated a complete prototype kit (refer to Figures 3 through 8) and on 22 April - 2 May 1969 with the aid of personnel from the New Cumberland Army Depot and Fort Eustis, installed the kit in an aircraft at Fort Eustis that was once flying in Viet Nam and is now non-flyable. The fit of the kit was reviewed jointly by the contractor and the representative of the Contracting Officer.

Some changes in foam block configuration were agreed upon and the kit was removed. No flight test was conducted.

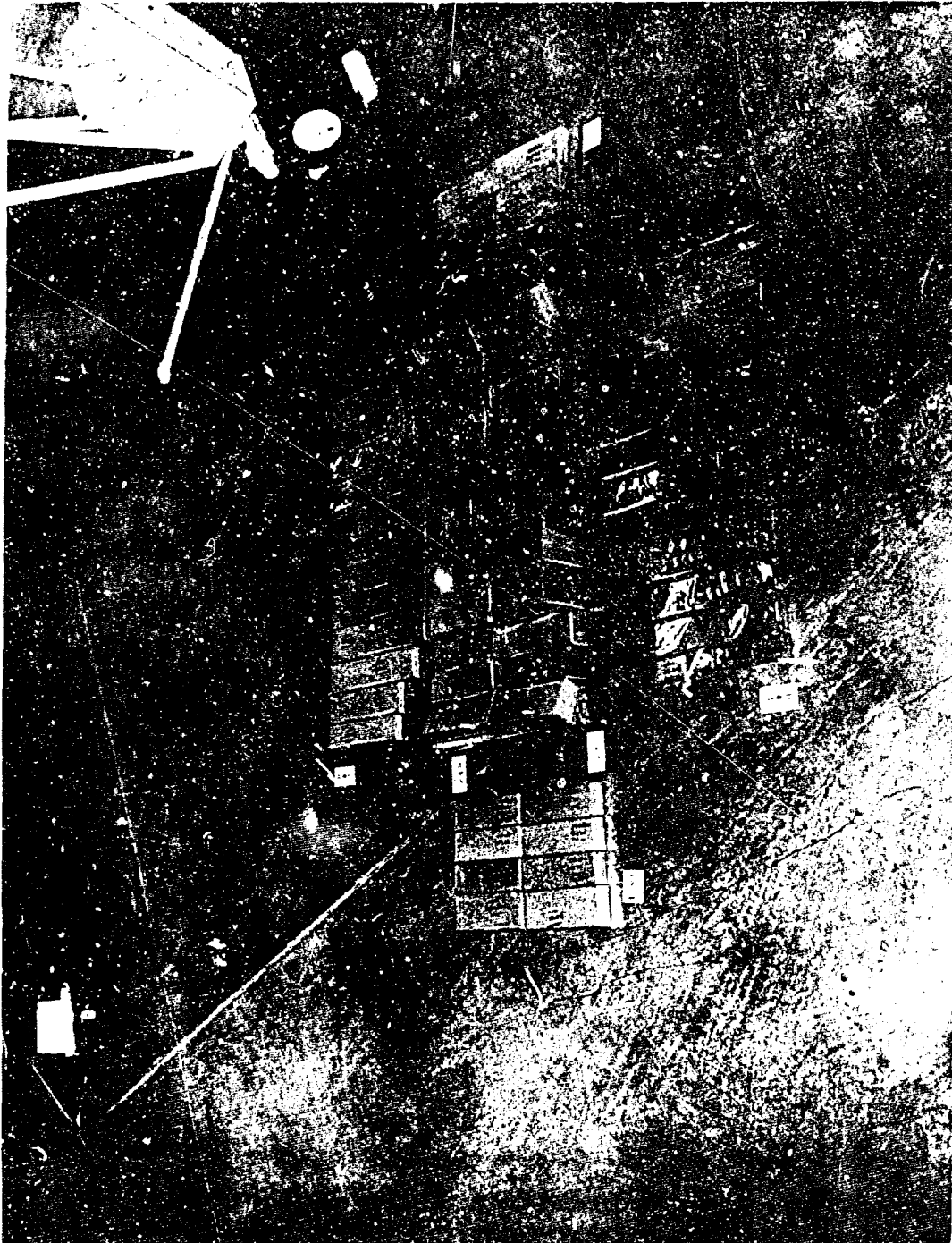


Figure 3. CH-54A, Fire Suppression Foam Blocks for Cell No. 1.

12319-3



Figure 4. CH-51A, Fire Suppression Foam Blocks for Cell No. 2.

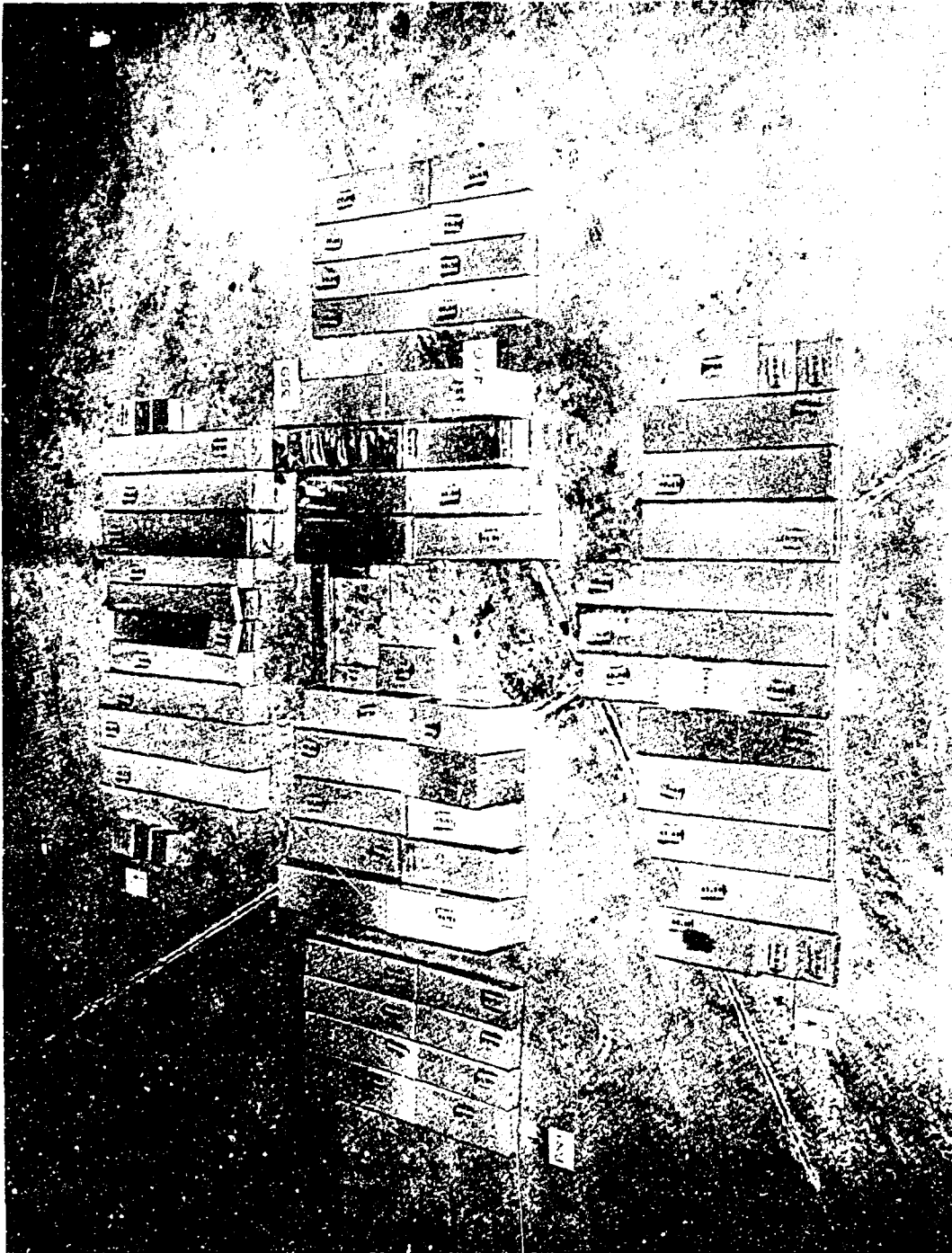


Figure 5. CH-54A, Fire Suppression Foam Blocks for Cell No. 3.

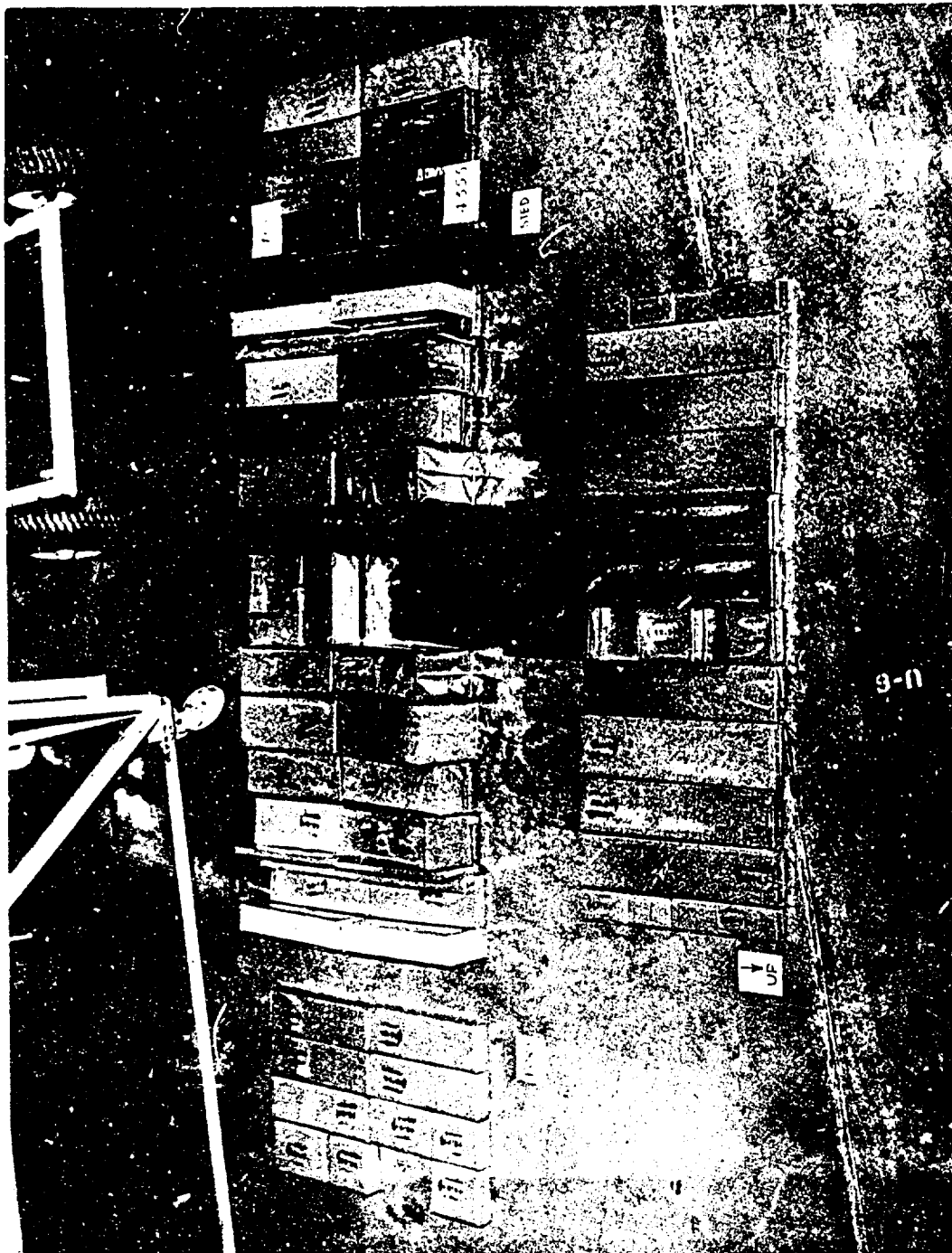


Figure 6. CH-54A, Fire Suppression Foam Blocks for Cell No. 4.

12319-6

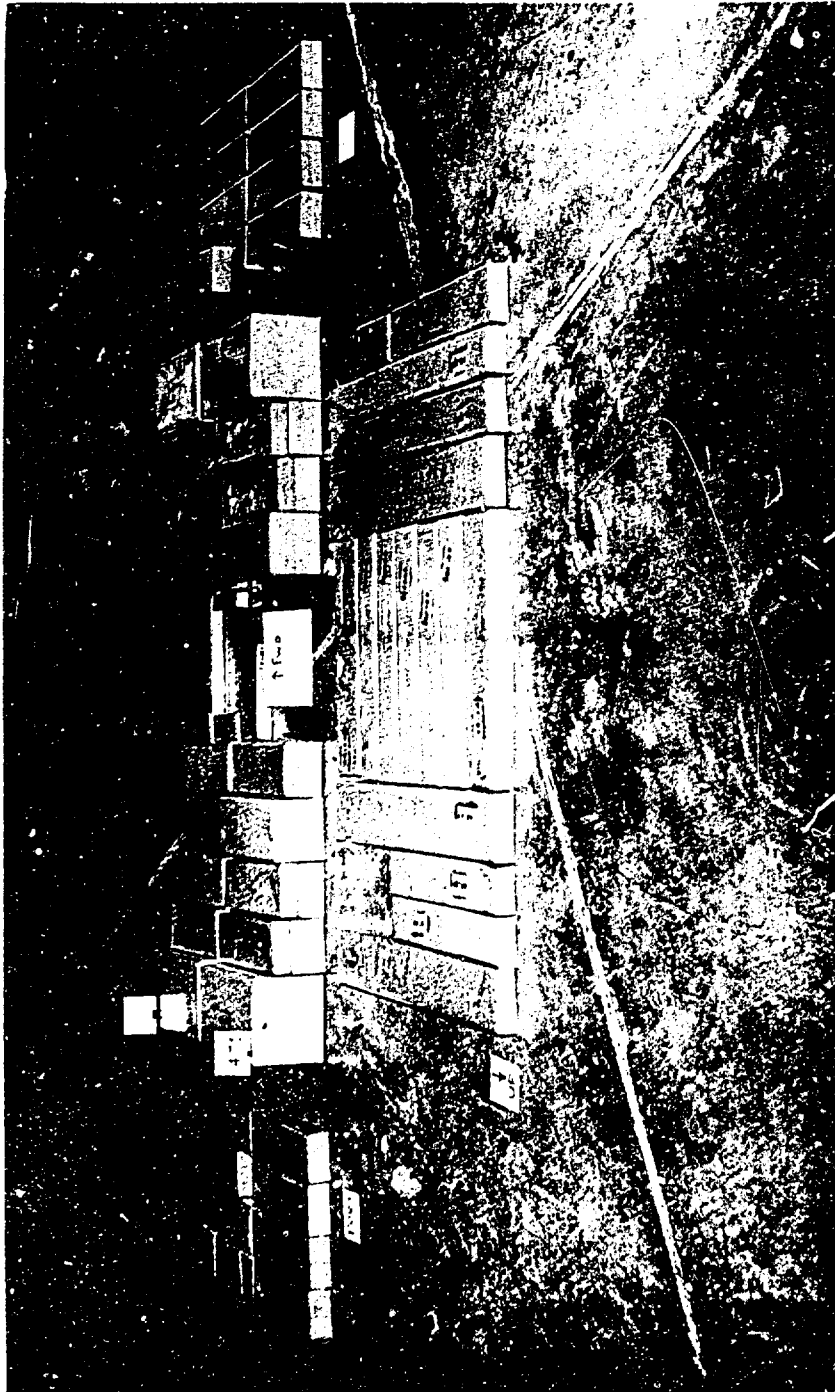


Figure 7. CH-54A, Fire Suppression Foam Blocks for Cell No. 5;
Partial Display.



Figure 8. CH-54A, Internal View of Cell No. 5 with Fire Suppression Foam Partially Installed.

Of all the aircraft examined under this contract, the CH-54A has the largest void space on the sides and bottom of its fuel tanks. The lower hemisphere of the fuel tanks can be almost 100 percent covered with foam, thus affording maximum protection.

e. U-6A (Beaver)

An aircraft was made available for examination at Fort Eustis, Virginia on 29 July 1968. This aircraft has five fuel tanks, one 21.5-gallon tank at each wing tip and three under floor tanks of 35.7, 35.6 and 25.5 gallons each.

It was recommended that no foam be placed in the 1.18 inch thick void at the inboard face of each tip tank since fuel is used from these tanks first, the void is small, and the inboard face is probably the least likely of all faces to receive a hit from an incendiary projectile. The seats and floorboards were removed to reveal the three underfloor tanks. Sketches were prepared to describe the configuration of the foam that would be placed on the front, back, left and right sides of all three cells. There is no space under the metal tanks for foam. The foam mockup of the kit was fabricated immediately on the site and its fit was reviewed.

The contractor then fabricated a complete prototype kit (refer to Figures 9, 10, and 11), and on 12 February 1969 installed it on a flyable aircraft. The U. S. Army Aviation Test Board then conducted the 200-hour flight test.

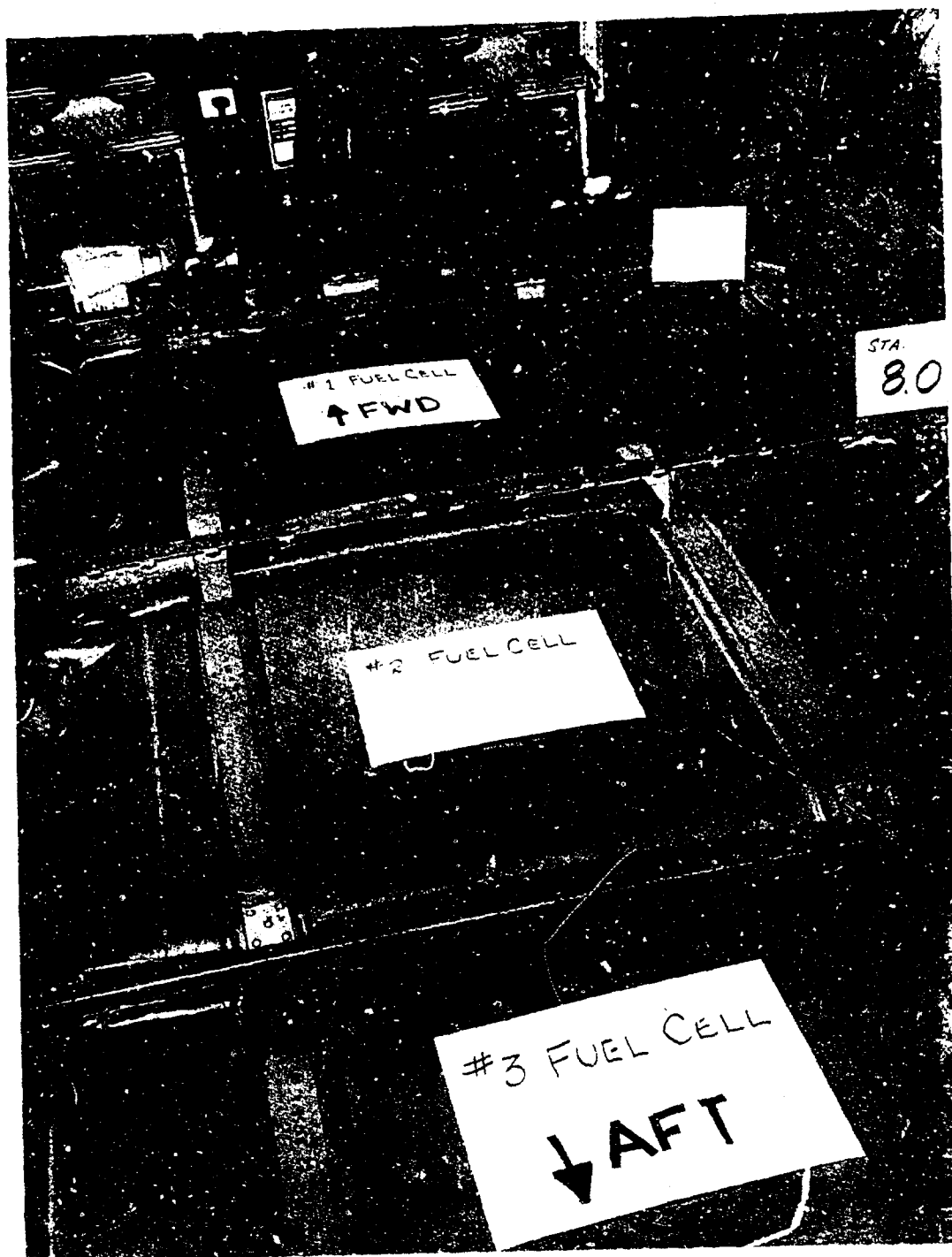
The report issued 29 January 1970 under USATECOM Project No. 4-AI-999-000-001, generated by the U. S. Army Aviation Test Board, describes the installation requirements and procedure, and the maintainability and reliability. No unsafe features, unscheduled maintenance or deficiencies were found. One shortcoming was reported, however. An improper seal at a bottom corner of a block allowed 0.8 pound of moisture to be absorbed by the polyurethane foam during the 200-hour flight test. The entire kit weighed 5.63 pounds. The percent weight gain therefore, amounted to 14 percent.

The kit drawings now have a note that describes the minimum seal width requirements on the film envelope. The kit as designed appears to be able to provide the additional protection from fire as intended.



12319-9

Figure 9. U-6A, Fire Suppression Foam Blocks Shown Alongside
U-6A Aircraft.



12319-10

Figure 10. U-6A, Fire Suppression Foam Blocks Installed Around Fuel Tanks:
Tanks Identified.



12319-11

Figure 11. U-6A, Fire Suppression Foam Blocks Installed on Bulkhead
Aft of Fuel Tanks.

f. OV-1A (Mohawk)

An aircraft was made available for examination at Fort Eustis on 7 August 1968. This aircraft has a single 297-gallon rubber bladder fuel cell in the fuselage. The cell is surrounded with antiflowering liner.

After removal of the cell and liner, a void space was revealed on the sides and bottom of the cell. Its thickness on the front and rear face of the cell was 1.50 inches, 1.75 inches on the left and right side, and 2.50 inches thick on the bottom face. Sketches were prepared to describe the configuration of each block of foam that was to be cut to fit between the stringers and ribs for the prototype kit.

The contractor then prepared a complete prototype kit (refer to Figures 12 and 13) and on 9 March 1969 installed it in aircraft S/N 68-15931 at Fort Rucker. The fit check of this kit was reviewed jointly by the contractor and the representative of the Contracting Officer and approved. The Aviation Test Board then conducted the 200-hour flight test.

The report issued 9 October 1969 under USATECOM Project No. 4-AI-999-000-001, generated by the U.S. Army Aviation Test Board, describes the installation requirements and procedure and the maintainability and reliability. No unsafe features, unscheduled maintenance, deficiencies or shortcomings were found.

The external foam kit as designed covers almost 100 percent of the four sides and bottom of the fuel tank and fills all voids very completely thus providing maximum protection from the fire that could result from a hit by incendiary projectiles.

g. U-1A (Otter)

A U-1A was made available for examination at Fort Eustis on 31 July 1968. This aircraft has four fuel tanks of approximately 53 gallons each located under the floor. In order to gain access to the fuel tank area, the subfloor rivets were removed.

After examination, the conclusion reached by the Goodyear engineer and the representative of the Contracting Officer was that a foam kit could not be designed for this aircraft that could be installed at the lowest possible echelon of maintenance. The space under the fuel tanks, between the inner and outer skins is inaccessible. It is possible to put foam on the aft face of the aft tank but structural modification would be necessary.

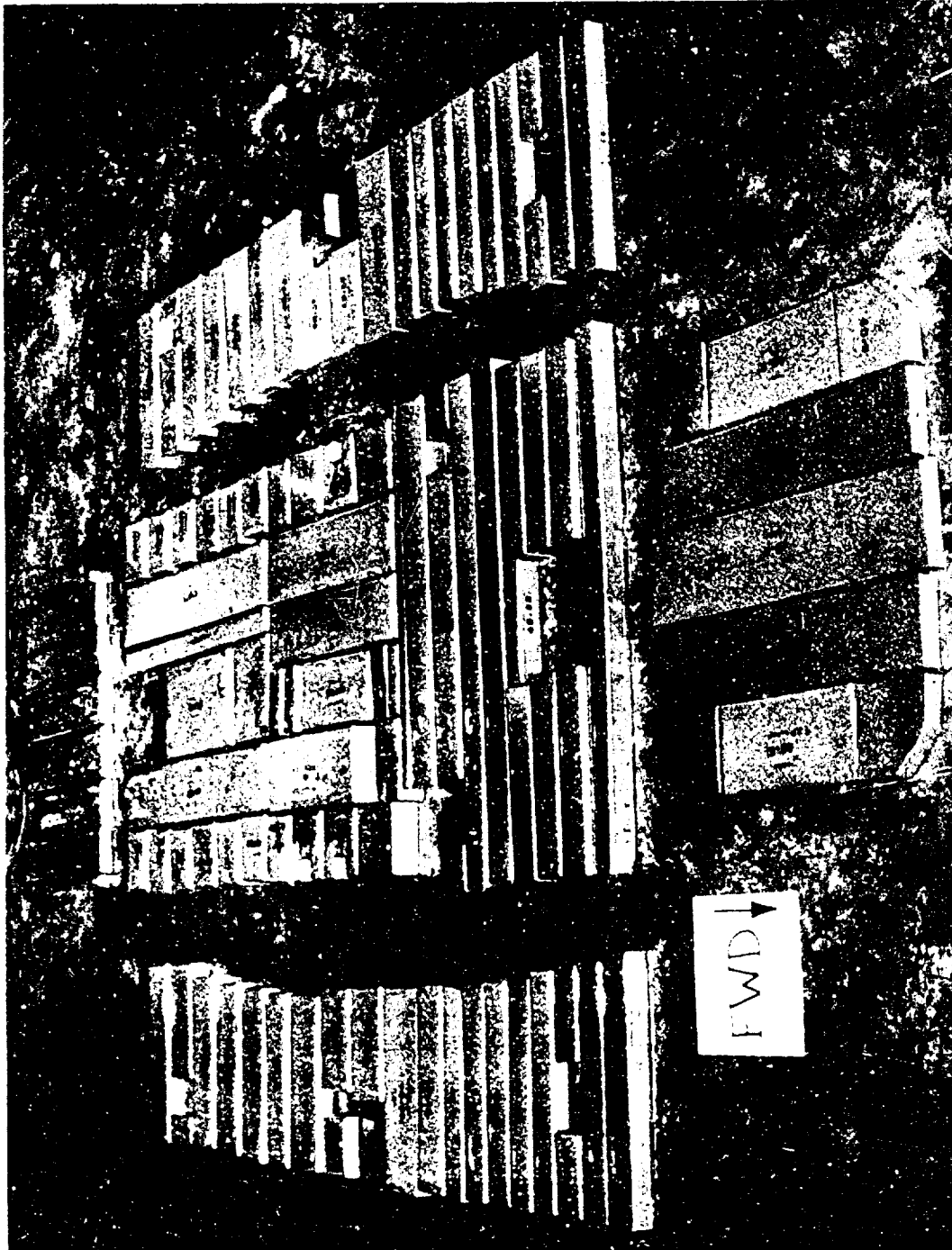
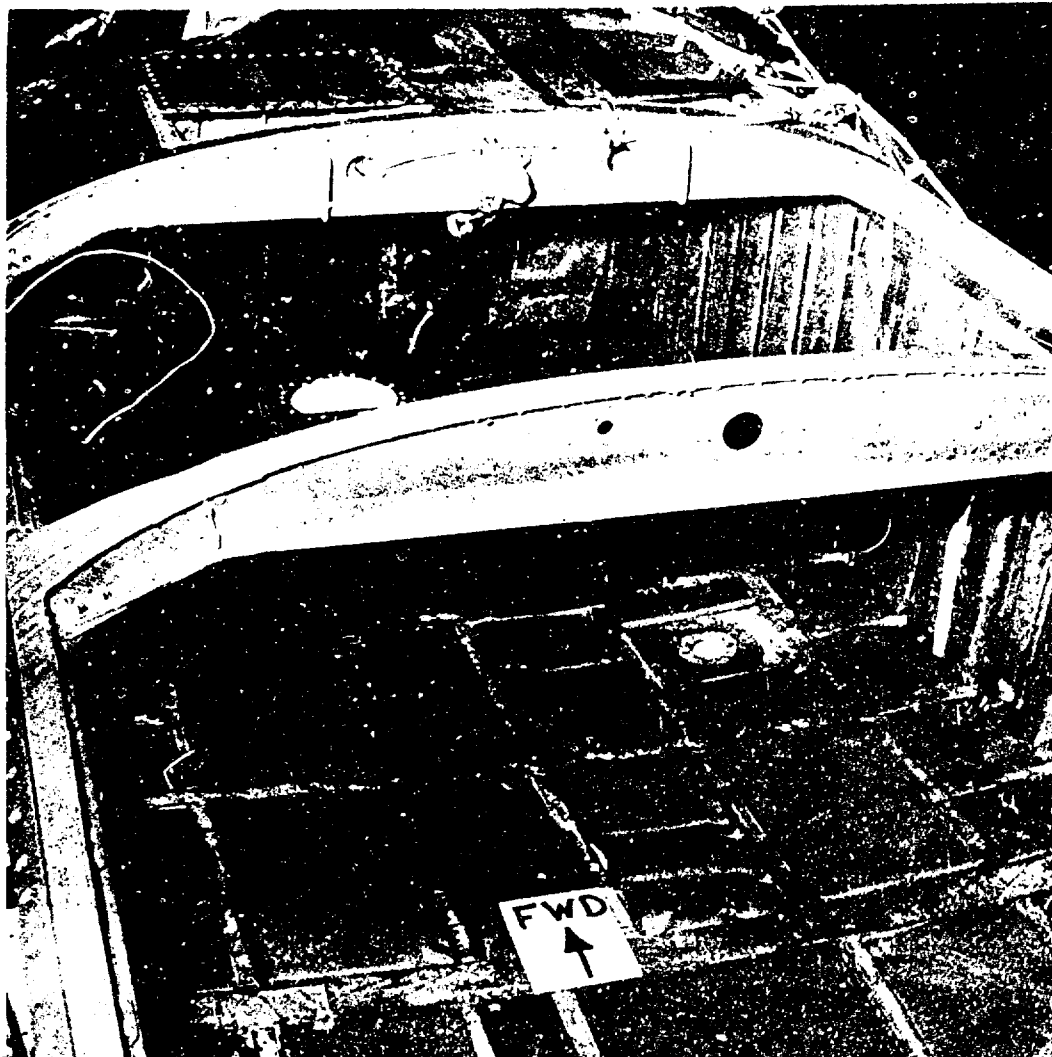


Figure 12 - OV-1, Foam, Fire Suppression Foam Blocks for the
OV-1 Aircraft Laid Out on Hangar Floor.



12319-13

Figure 13. OV-1, Foam, View of OV-1 Fuel Cell Cavity with Fire Suppression Foam Installed.

Considering the requirements and limits of this contract, no fire suppressant void filler foam kit was designed for the Otter.

h. OH-23G (Raven)

An OH-23D was made available for examination at Fort Eustis on 30 July 1968. For the purpose of this examination, the "D" model served adequately since the fuel tank areas are the same for the "G" model.

The Goodyear engineer and the representative of the Contracting Officer concluded that since major modification to the aircraft structure would be necessary to gain access to any voids surrounding the fuel tank, a foam kit could not be designed for this aircraft within the requirements and limits of the contract.

i. O-1D (Bird Dog)

An aircraft was made available for examination at Fort Eustis on 29 July 1968. This aircraft has two fuel tanks of 21.5 gallons each, one located in each wing immediately outboard of the fuselage. A panel was removed from the wing top and a metal fuel tank removed.

Above and below the tank is a void 0.5 inch deep. In the tank cavity, forward and aft of the tank, is a one inch thick void. There is no access to the outside of the tank cavity in the leading and trailing edge of the wing, or outboard of the tank cavity in the wing. The inboard face of the tank cavity is at the cabin.

Considering the requirements and limits of this contract, the Goodyear engineer and the representative of the Contracting Officer concluded that no foam kit should be designed for this aircraft.

j. U-8D (Seminole)

A U-8D was made available for examination at Fort Eustis on 1 August 1968. This aircraft has four rubber bladder cells in each wing that can be removed through an access door under each cell. The fuel cells rest against an inner skin that is separated from the outer skin by stringers, thus creating a void between. There is no access to this void unless the wing is dismantled by drilling out the rivets.

The Goodyear engineer and the representative of the Contracting Officer concluded that since major modification to the aircraft structure would be necessary to gain access to any voids surrounding the fuel tanks, a foam kit could not be designed for this aircraft within the requirements and limits of the contract.

k. U-10A (Courier)

A U-10A was made available for examination at Fort Bragg, North Carolina on 10 September 1968. This aircraft has a 30-gallon tank in each wing. Above and below the tank is a 0.5 inch thick void formed by stringers between an inner and outer skin. This area is accessible only by dismantling the wing. Control rods and cables are adjacent to the forward face of the fuel tank. The outboard face is not accessible.

The Goodyear engineer and the representative of the Contracting Officer concluded that since major modification to the aircraft structure would be necessary to gain access to any voids surrounding the fuel tanks, a foam kit could not be designed for this aircraft within the requirements and limits of the contract.

l. U-21A (Ute)

A U-21A was made available for examination at Fort Eustis on 1 August 1968. This aircraft has four wing tanks plus a nacelle tank on each side. There is no access to the small voids surrounding the tanks unless the wing is dismantled by drilling out the rivets.

The Goodyear engineer and the representative of the Contracting Officer concluded that since major modification to the aircraft structure would be necessary to gain access to any voids surrounding the fuel tanks, a foam kit could not be designed for this aircraft within the requirements and limits of the contract.

m. U-9B/C (Aero Commander)

A U-9 was made available for examination at Fort Rucker, Alabama on 11 March 1969. This aircraft has four rubber bladder fuel tanks in each wing outboard of the fuselage and a single tank in the fuselage above the baggage compartment. These cells rest on the lower wing skin or on a void filler placed in the wing. There is no access to the forward face of the tanks. The aft face is covered with plumbing. The outboard faces are accessible only through a small hand hole. The only practical location for a foam block would be on the underside of the fuel tank that is located over the baggage compartment. Then only 40 percent of the bottom surface of that tank could be covered which would amount to about 4 percent of the total bottom surface of the fuel tank system.

The Goodyear engineer and the representative of the Contracting Officer concluded that a foam kit could not be designed for this aircraft within the requirements and limits of the contract.

n. UH-1B (Iroquois)

On 8 October 1968 a UH-1B was examined and measured at ARADMAC. This aircraft has two 83-gallon rubber bladder fuel tanks located above the floor and behind the cabin area. They are rectangular in shape.

Foam cannot be placed against the outboard surface of the cells since this is the skin of the aircraft. Foam cannot be placed against the forward surface of the cells since this is within the cabin area. Foam blocks were designed to fit on the inboard, aft, and bottom surfaces.

A complete prototype kit was fabricated and then shipped to Fort Rucker on 11 February 1969 where an attempt was made to install the foam kit in aircraft S/N 63-8659. Complete installation was impossible due to the presence of non-standard test equipment and associated wiring still remaining from another completed test project.

"Special Additional UH-1B Kit"

At this time the representative of the Contracting Officer asked that a "special additional UH-1B kit" be designed for this aircraft so that flight test experience might be gained. The aircraft was measured, a prototype kit fabricated and on 9 December 1969 the kit was installed in S/N 63-8659 at Fort Rucker. Photographs were taken. Refer to Page 23 of this report for additional discussion of this aircraft.

Since the attempt at installing the "standard B kit" at Fort Rucker on 11 February 1969 failed, the representative of the Contracting Officer re-scheduled the fit check to take place 7 October 1969 at ARADMAC. The kit was installed in aircraft S/N 66-14007 which was ready to leave the facility. No holes were drilled in the aircraft; the retainer cords were held in a temporary manner.

Some changes in foam block shape were agreed upon and the kit was removed. No flight test was conducted. Refer to Page 23 in this report for the flight test of a similar kit. The kit as designed appears to be able to provide the additional protection from fire as intended.

o. UH-1C (Iroquois)

The history of the development of a foam kit for the UH-1C is exactly like that of the UH-1B as described on Page 22. The "C" model fuel tank configuration is similar to the "B". The "C" model was examined at the same time and foam blocks placed as proposed for the "B" model. (Refer to Figures 14 and 16.) The foam block configuration is slightly different between the two models. All comments made on the UH-1B are applicable to the UH-1C kit.

p. UH-1B (Iroquois) "Special Test Kit"

The representative of the Contracting Officer requested that this kit be fabricated and flight tested when it was realized that it would be difficult to locate a production version of a UH-1B aircraft for the 200-hour flight test. The UH-1B selected for this kit was S/N 63-8659 at Fort Rucker. The aircraft was examined and measured on 11 February 1969.

A prototype kit (refer to Figures 15, 17, and 18) was fabricated by the contractor and on 9 December 1969 installed in the aircraft at Fort Rucker. The Aviation Test Board then conducted the 200-hour flight test.

The report issued 1 June 1970 under USATECOM Project No. 4-AI-999-000-001, generated by the U.S. Army Aviation Test Board, describes the installation procedure, maintainability and reliability. No shifting, interference or unsafe features were noted. One shortcoming was reported. Improper sealing of the plastic cover over the foam blocks in the "hell-hole" allowed 0.69 pounds of moisture to be absorbed by three foam blocks during the flight test. Since the entire kit weighed 6.81 pounds, this amounted to a 10 percent weight gain.

The kit drawings now have a note that describes the minimum seal width requirements on the film envelope. The kit appears to provide additional protection to the fuel tank area on the inboard, aft, and bottom surfaces as intended.

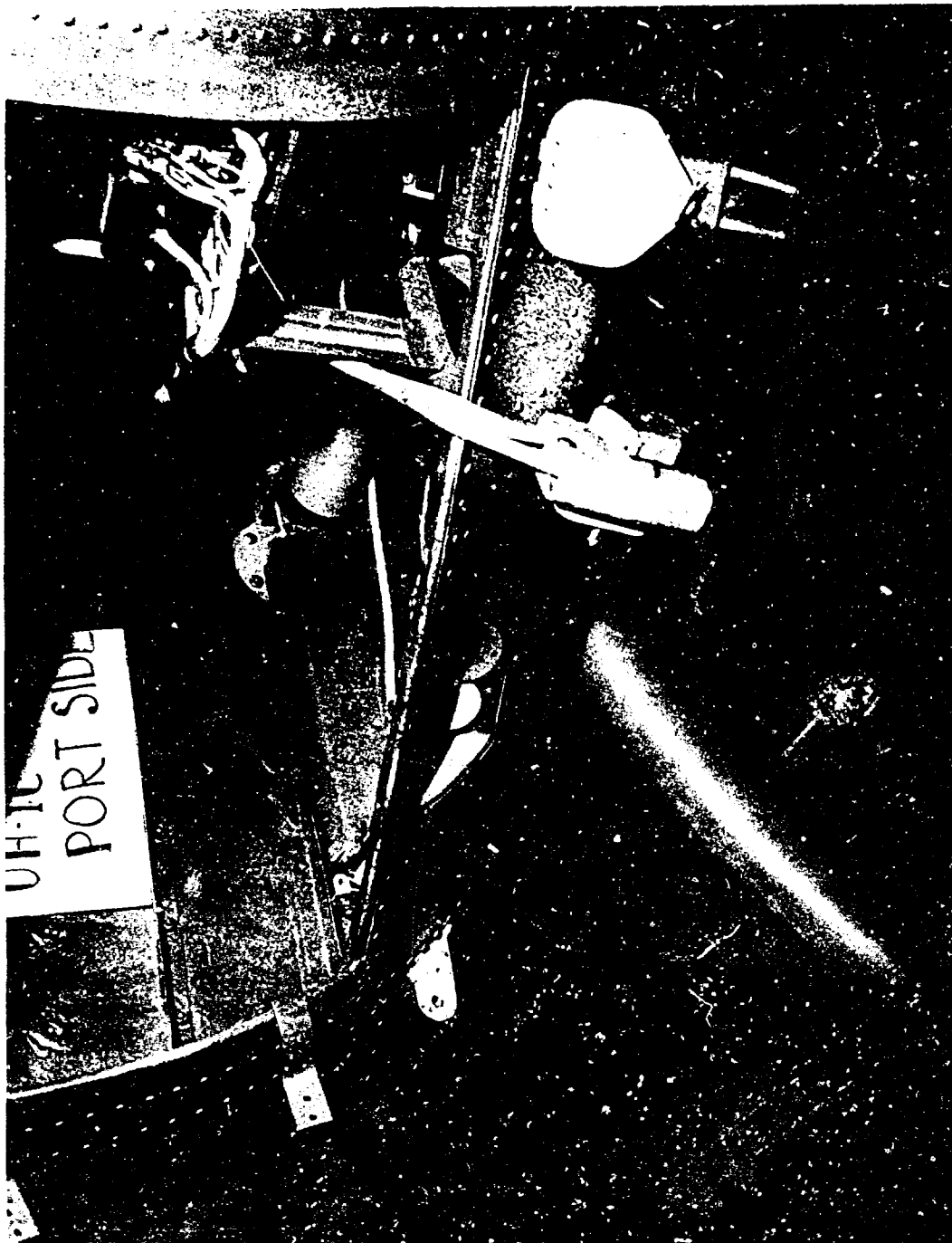


Figure 11. UH-1C, Foam, Fire Suppression Foam Blocks Installed on Port Side Under Battery Compartment of UH-1C Aircraft.

12319-14

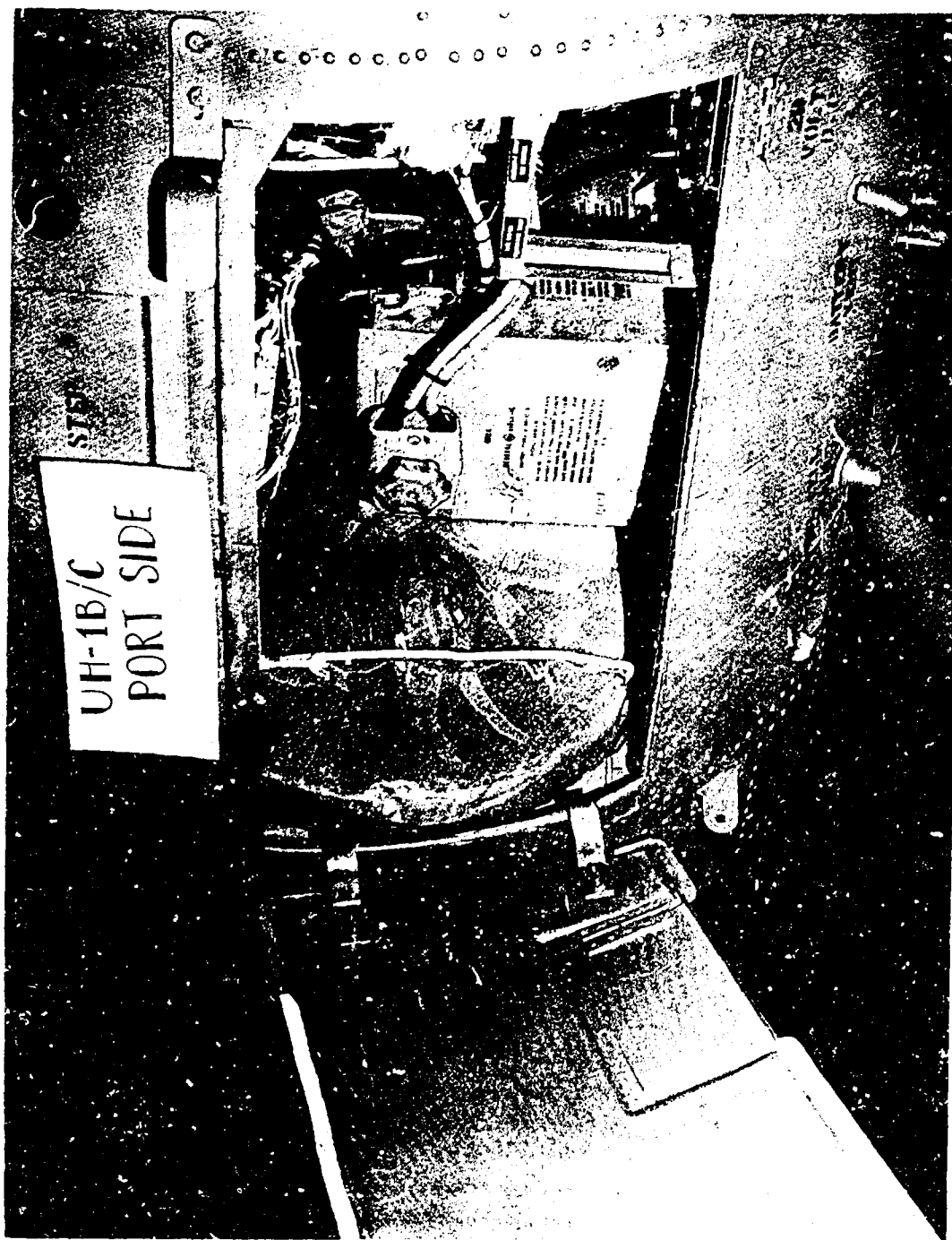


Figure 15. UH-1B, Foam, Fire Suppression Foam Blocks, Installed on Port Side in Battery Compartment; with Battery Installed.

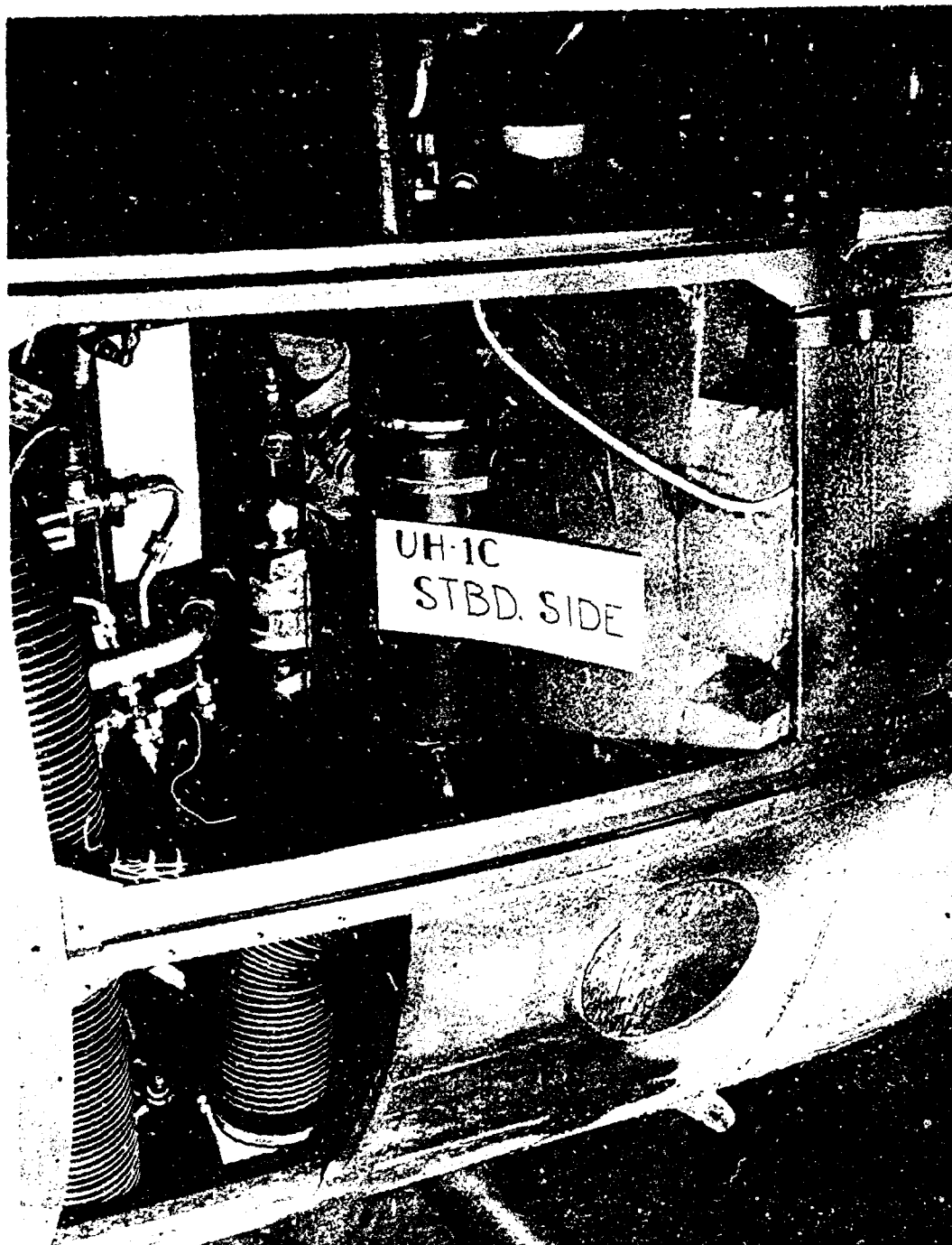
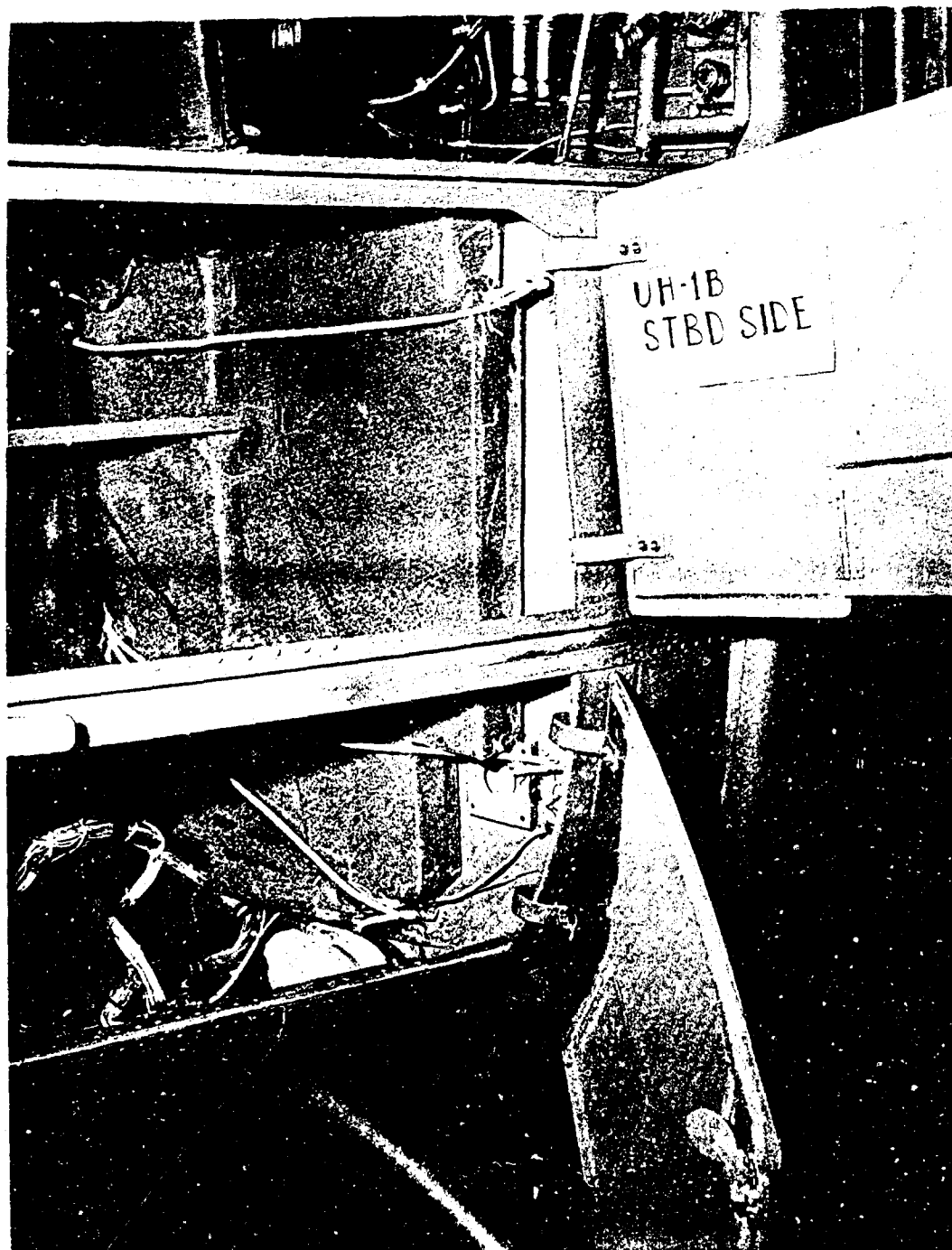


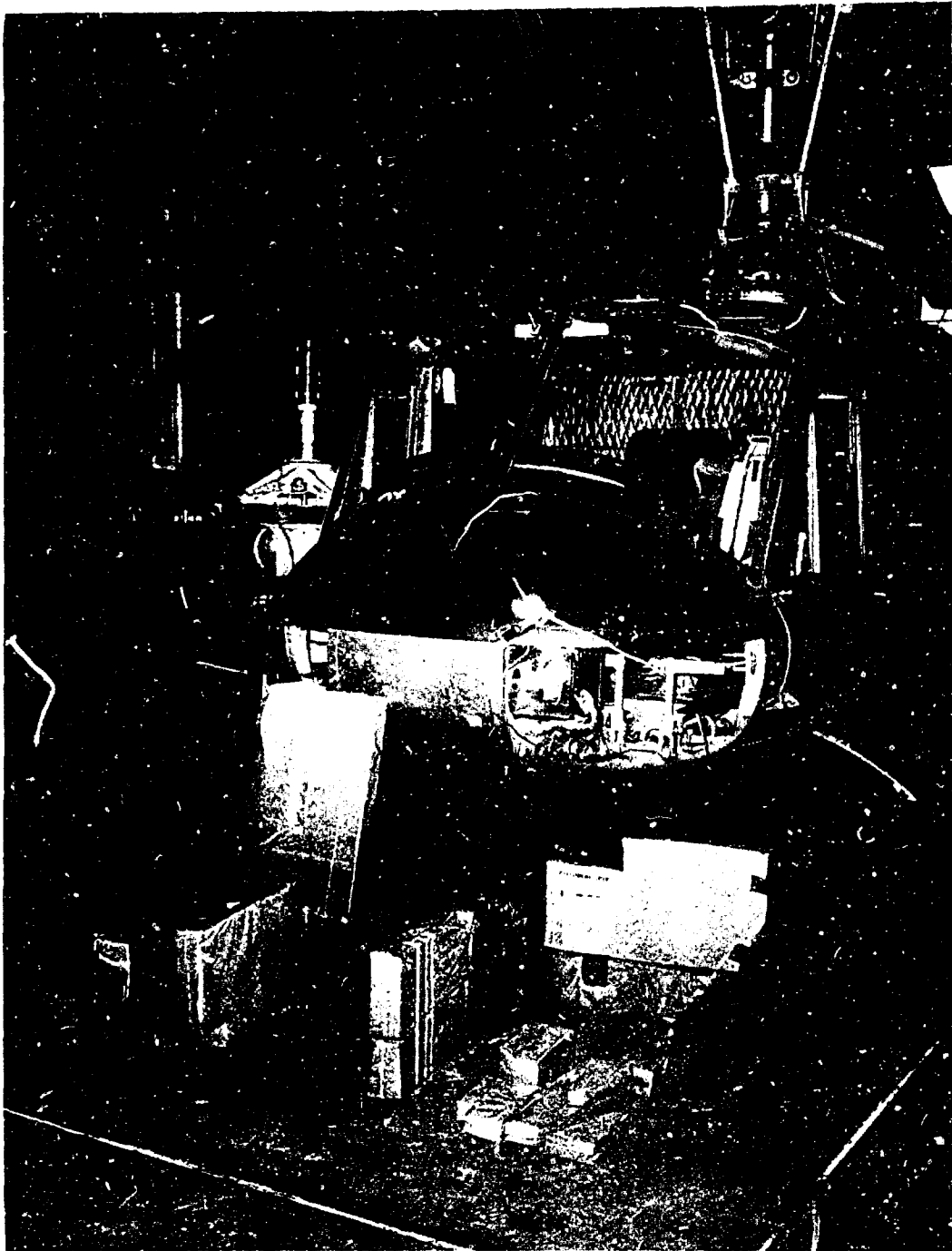
Figure 10. UH-1C. Foam, Fire Suppression Foam Blocks, Installed on Starboard Side in Heater Compartment.

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12319-17

Figure 17. UH-1B, Foam, Fire Suppression Foam Installed on Starboard Side in Heater Compartment.



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Figure 18. UH-1B, Foam, Fire Suppression Foam Blocks as Installed.

LIST OF VOID FILLER FCAM KIT DRAWINGS

<u>Aircraft</u>	<u>Drawing no.</u>	
AH-1G (Cobra)	ADF 8000433	
CH-54A (Tarhe)	ADF 8000468 ABF 8000487 ABF 8000488	Sheets 1 through 10
U-6A (Beaver)	ADF 8000111	Sheets 1 through 3
OV-1A (Mohawk)	ADF 8000109	
UH-1B (Iroquois)	ACF 8000631 ACF 8000515	Sheets 1 through 9 Sheets 2, 3, and 8 through 14
UH-1C (Iroquois)	ACF 8000515	Sheets 1 through 16

Unclassified

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13. ABSTRACT Fifteen (15) various Army aircraft were examined to determine if a fire suppressant, void filler foam kit could be designed for each of them that would fill the void space surrounding the lower hemisphere of the fuel tank; thus reducing the susceptibility of the aircraft to fire from incendiary rounds. If the examination indicated that a kit was feasible, a kit was designed, fabricated, installed, and flight tested. No adverse flight characteristics were discovered with any of the foam kits installed. Each of the kits designed will serve the purpose for which it was intended.		

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Explosion						
Fire Suppression						
Void Filler						
Foam						
Survivability Equipment						
Ballistic Protection						
OH-6A Aircraft						
AH-1G Aircraft						
UH-1D Aircraft						
CH-54A Aircraft						
U-6A Aircraft						
OV-1A Aircraft						
U-1A Aircraft						
OH-23G Aircraft						
O-1D Aircraft						
U-8D Aircraft						
U-10A Aircraft						
U-21A Aircraft						
U-9B/C Aircraft						
UH-1B Aircraft						
UH-1C Aircraft						

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